

PAYLOAD FLIGHT HAZARD REPORT			a. NO:	AMS-02-F15
b. PAYLOAD Alpha Magnetic Spectrometer-02 (AMS-02)			c. PHASE:	II
d. SUBSYSTEM:	Cryogenic	e. HAZARD GROUP:	Thermal Extremes	
f. DATE:			March 31, 2006	
g. HAZARD TITLE: Thermal Extremes from Cryogenics			i. HAZARD	CATASTROPHIC X
			CATEGORY:	CRITICAL
h. APPLICABLE SAFETY REQUIREMENTS: NSTS 1700.7B and ISS Addendum 200.1b, 201.3, 206, 208				
j. DESCRIPTION OF HAZARD: Excessively low temperatures created by the storage and transfer of the AMS-02 Liquid helium can cause the liquefaction or freezing of the surrounding atmosphere. Contact between this cryogenic material and AMS-02 systems or structures could degrade those systems or structures and lead to flight failure/hazards.				
k. CAUSES 1. Storage of Superfluid Helium 2. Liquefaction Of Air/Release Of Cryogens. 3. Leakage/impingement of cryogenic vents <i>(list)</i> Note: Thermal Extremes and the impact on Structures, Pressure Systems, EVA crew and other safety critical hazards are addressed in separate hazard reports.				
o. APPROVAL		PAYLOAD ORGANIZATION		SSP/ISS
PHASE I				
PHASE II				

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PHASE III				
I. HAZARD CONTROL (CONTROL), m. SAFETY VERIFICATION METHODS (SVM), n. STATUS OF VERIFICATIONS (STATUS)				OPS CONTROL
1. CAUSE: Storage of Superfluid Helium				
<p>1.1 CONTROL: Superfluid Helium (SFHe) is contained within the SFHe tank that is situated inside the Vacuum Case. Thermal design of the Vacuum Case is to preclude thermal transfer that would heat the SFHe and conversely, chill the exterior of the AMS-02. Unless the Vacuum Case experiences a failure, the exterior is expected to be at local ambient during ground operations and in orbit this will not change. The thermal conductance to the AMS-02 structure will be calculated during the thermal analysis. EVA touch temperature hazards are addressed in AMS-02-F14.</p> <p>1.1.1 SVM: Review of Design</p> <p>1.1.2 SVM: Inspection of as built hardware</p> <p>1.1.3 SVM: Thermal Analysis</p> <p>1.1.4 SVM: Testing of VC thermal performance with cryogenic systems operating.</p> <p>1.1.1 STATUS: Open</p> <p>1.1.2 STATUS: Open</p> <p>1.1.3 STATUS: Open</p> <p>1.1.4 STATUS: Open</p>				
2. CAUSE: Liquefaction of Air/Release of Cryogens				
<p>2.1 CONTROL: During all ground phases including when the AMS-02 is in the Shuttle Payload Bay, all identified locations where cryogenics could be release or where air might liquefy will be protected with “diapers” or “catch pans” as appropriate to preclude excessive cold contact with neighboring AMS-02 flight systems and structures.</p> <p>2.1.1 SVM: Preflight Thermal Assessment to establish potential leak/liquefaction locations</p> <p>2.1.2 SVM: Review of Design</p> <p>2.1.1 STATUS: Open</p> <p>2.1.1 STATUS: Open</p>				

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3. CAUSE: Leakage/Impingement of Cryogenic Vents			
3.1 CONTROL: The SFHe vents are positioned to preclude impingement of very cold gases upon critical structures and systems. 3.1.1 SVM: Impingement Analysis of possible cryogenic vent locations 3.1.2 SVM: Inspection of as built hardware 3.1.1 STATUS: Open 3.1.2 STATUS: Open			
Notes:			

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ACRONYMS	
°C – Degrees Centigrade (Celsius)	EVA – Extravehicular Activity
°F – Degrees Fahrenheit	SFHe – Superfluid Helium
AMS-02 – Alphamagnetic Spectrometer - 02	VC – Vacuum Case

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TBS	
Locations of Cryogenic Venting Potential	
TBS	
Locations of Potential Thermal Extremes (Contact Exposure)	